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EXAMINER

KIM, DAVID S

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte OSCAR E. AGAZZI

Appeal 2009-003746
Application 09/765,014
Technology Center 2600

Before JAMES D. THOMAS, MAHSHID D. SAADAT, and
CARL W. WHITEHEAD, JR., *Administrative Patent Judges*.

WHITEHEAD, JR., *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

STATEMENT OF THE CASE

Appellant seeks our review under 35 U.S.C. § 134 of the Examiner's final decision rejecting claims 1, 6-9, 11, 12, 18-20, 22, 23, 28, 32, 37, 38, 42, 57, 61, 65, 70, and 71.² Appeal Brief 11. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We AFFIRM.

Claim 1, which further illustrates the invention, follows:

1. A method for high-speed transmission of information data on an optical channel, the method comprising:
 - encoding information via a trellis encoder to produce digital multilevel symbols;
 - equalizing the digital multilevel symbols to compensate for characteristics of the optical channel, said equalizing comprising precoding the digital multilevel symbols using a Tomlinson-Harashima precoder;
 - converting the digital multilevel symbols into analog multilevel signals; and
 - transmitting the analog multilevel signals over the optical channel.

Appellant appeals the following rejection:

Claims 1, 6-9, 11, 12, 18-20, 22, 23, 28, 32, 37, 38, 42, 57, 61, 65, 70, and 71 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ling³ in view of any/all of Ungerboeck,⁴ Lee,⁵ and Schlegl⁶ and further in view of Uyematsu⁷ and Winters.⁸ Answer 4-11.

² Claims 5, 16, 31, 36, 41, 45, 60, 64, 69, and 74 were rejected under 35 U.S.C. § 103(a). See Answer 2. However, Appellant does not present this rejection for review. See Appeal Brief 11.

³ WO 98/39871; September 11, 1998.

⁴ Gottfried Ungerboeck, *Channel Coding with Multilevel/Phase Signals*, 28 IEEE TRANSACTIONS ON INFO. THEORY 55 (Jan. 1982).

Rather than repeat Appellant's arguments or the Examiner's positions in their entirety, we refer to the Appeal Brief (filed July 2, 2008) and the Answer (mailed July 25, 2008) for their respective details. In this decision, we have considered only those arguments actually made by Appellant. Arguments which Appellant could have made but did not make in the Brief have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2008).

ISSUE

Does the combination of multiple references cited by the Examiner establish a prima facie case of obviousness by disclosing a method and apparatus that employs a Tomlinson-Harashima precoder in an optical transmission system?

ANALYSIS

The Examiner provides motivation to apply the method of Ling to an optical channel based upon Ling's and Uyematsu's disclosures of a trellis coded modulation (TCM) scheme and Uyematsu's teaching that the TCM scheme can be applied to optical communications systems. Answer 5. However, the Examiner admits that the "only portion of a TCM system that

⁵ L.H. CHARLES LEE, CONVOLUTIONAL CODING: FUNDAMENTALS AND APPLICATIONS (Artech House 1997).

⁶ CHRISTIAN SCHLEGEL, TRELLIS CODING (IEEE Press 1997).

⁷ Tomohiko Uyematsu et al., *Trellis Coded Modulation for Multilevel Photon Communication System*, 2 SING. ICCS/ISITA '92, at 582 (Nov. 1992).

⁸ Jack H. Winters et al., *Reducing the Effect of Transmission Impairments in Digital Fiber Optic Systems*, IEEE COMM. MAG., June 1993, at 68.

appears lacking in the system of Ling is an express disclosure of a trellis encoder.” *Id.* The Examiner states that it is known that trellis encoding incorporates convolutional encoding and mapping as shown in Ungerbreck, Lee, and Schlegl and addresses Ling’s deficiency by referring to Ling’s basic elements of a trellis encoder – a convolutional encoder 320 and bit to symbol mapping 322. *Id.* The Examiner concludes that one of ordinary skill in the art would have been motivated to employ Ling’s convolutional encoder 320 and bit to symbol mapping 322 as a trellis encoder since the trellis decoder 366 of Ling implies the complementary use of trellis encoding. *Id.*

However, Appellant argues that claim 1 requires a Tomlinson-Harashima precoding (THP) in an optical transmission system, and Ling is the only prior art cited by the Examiner that teaches THP, but Ling is directed to a copper based transmission system and not an optical transmission system. Appeal Brief 12-13. Appellant surmises that it would not have been obvious to one of ordinary skill in the art to implement THP in an optical transmission system because optical transmission systems have different channel characteristics and present different challenges than copper cabling transmission systems. *Id.* at 13. Appellant further argues that the Examiner has failed to provide any motivation to apply the THP of Ling to an optical communication system. *Id.*

The Examiner did not provide motivation to apply the THP of Ling to an optical communication system because he relied upon the references’ disclosures of trellis encoder/decoder for his motivation to combine the references. *See Answer 5.* There was no need for the Examiner to provide motivation for combining every element of the prior art references. Further,

while Appellant argues that using a THP in a copper cabling transmission system is challenging, Appellant has not offered any evidence that the THP had to be modified to operate in an optical system. In fact, Appellant employs THP without any significant modification to the precoding process.

Therefore, we will sustain the Examiner's rejection of independent claims 1, 11, 28, 32, 38, 42, 57, 61, 65, and 71 for the reasons stated above. We will also sustain the Examiner's rejection of dependent claims 6-9, 12, 18-20, 22, 23, 37, and 70 for the same reasons.

DECISION

The Examiner's rejection of claims 1, 6-9, 11, 12, 18-20, 22, 23, 28, 32, 37, 38, 42, 57, 61, 65, 70, and 71 is sustained.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(v) (2009).

ORDER AFFIRMED

babc

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